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Combined Approach to Large Ventral Hernias: Component Separation Enhanced by Abdominoplasty

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Abstract **Background:** Large Ventral Hernia (VH) reconstruction is a surgical challenge. Component Separation (CS) combined with lipoabdominoplasty (LA) enhances the contour deformity of the entire musculofascial layer. **Aim of the study:** Evaluation of the feasibility, early postoperative outcomes and possible complications of combining LA with CS in the repair of large VHs. **Methods:** This prospective study included twenty multiparous females subjected to large VH repair by combined CS and LA at Minia University Hospitals from July 2023 to February 2025. Primary study outcomes were operative time and hernia recurrence, while secondary outcomes included length of hospital stay, readmission rate and wound complications. **Results:** Mean age was 37.7±7.7 years and Body Mass Index (BMI) ranged between 25.5 and 35 kg/m^2. Mean operative time was 246±43.2 minutes. Mean length of hospital stay was 6.7±2.4 days. Overall complication rate was 25% (n = 5), including wound dehiscence, wound infection, hematoma, hypertrophic scar formation, umbilical necrosis, dog ear deformity and skin necrosis. No hernia recurrence or mortality were reported during the period of follow up (12 months). **Conclusion:** Hernio-abdominoplasty with component separation is an effective technique for repair of large ventral hernias with acceptable safety profile. We recommend this combined approach in selected patients but further studies are needed to verify long-term outcomes.

Key Words Component Separation, Abdominoplasty, Ventral Hernia, Abdominal Wall Repair, Surgical Outcomes, Postoperative Complications

INTRODUCTION

A wide midline Abdominal Wall Defect (AWD) is a difficult surgical challenge [1]. It commonly results from herniation after abdominal surgery (incisional hernia) but can also occur due to trauma, congenital anomalies or chronic increase in the intra-abdominal pressure [2,3].

Ventral Hernia (VH) is a defect in the abdominal wall fascia, excluding inguinal and hiatal hernias [4]. It is estimated that approximately 25% of individuals are either born with or will develop a VH during their lifetime [5]. These hernias occur in the anterior abdominal wall and include primary VHs (such as epigastric, umbilical, Spigelian and lumbar hernias) as well as most incisional hernias, including parastomal hernias. The European Hernia Society classifies VHs with a defect width greater than 10 cm as complex hernias [6].

The Component Separation (CS) technique, initially described by Albanese in 1951 [7] and later refined by Ramirez *et al.* [8] in 1990, involves the complete bilateral division of the external oblique aponeurosis, allowing the recti muscles to be mobilized closer to the midline.

VHs are often linked to abdominal wall laxity, particularly in females [9]. In such cases, a combined repair of the AWD and abdominoplasty has been proposed to enhance the overall musculofascial contour, remove excess skin and ultimately improve quality of life [10,11].

Although the combined use of abdominoplasty and CS in VH repair has been proposed,

evidence remains limited regarding its safety profile, readmission and complication rates.

The aim of this study is evaluation of the feasibility, early postoperative outcomes and possible complications of combining LA with CS in the repair of large VHs.

METHODS

Patients: In this prospective study, twenty female patients were subjected to Ventral Hernia (VH) repair using combined Component Separation (CS) and lipoabdominoplasty (LA) at Minia University Hospital, Egypt, between June 2023 and February 2025, following ethical approval and informed consent.

Eligible patients were adult females (18-50 years) fit for surgery, with VH defects 5-10 cm and abdominal wall redundancy. Exclusion criteria included age below 18 and above 50 years, BMI more than 35 kg/m^2, smoking, pregnancy or planned pregnancy, uncontrolled co-morbidities, recurrent/complicated/multiple hernias, active drug abuse or infection increasing surgical risk.

Methods

Detailed history was obtained, covering demographics, comorbidities and hernia- related history. Clinical data included BMI, hernia site, skin laxity, subcutaneous fat and myofascial weakness. Defect size was assessed preoperatively by physical examination, ultrasonography and Computed Tomography (CT) (Figure 1) and confirmed intraoperatively. Routine labs and chest X-ray were done for all patients.

Preoperative Marking

Patients were marked in the standing position. Landmarks include the midline, abdominal rolls, iliac crests, current and planned umbilical positions and a curved lower incision approximately 7 cm above the introitus. The superior excision limit was estimated by skin pinching and liposuction areas (flanks, abdominal flap) were marked (Figure 2).

Venous thromboembolism (VTE) prophylaxis with leg compression bandages and Enoxaparin 40 IU was given to high risk patients. One gram of I.V. ceftriaxone was given at induction of anesthesia.

Technique:

- Liposuction is performed under general anesthesia in supine position. Following sterilization, a tumescent solution (500 ml normal saline, 7 ml lidocaine 2%, 0.5 ml epinephrine 1/10000) is infiltrated-using a 3 mm infiltration catheter-into the subcutaneous tissue until skin turgor is achieved. After 20 minutes, liposuction is performed using a 4 mm cannula for the deep plane and a 3 mm cannula for final refinement
- **Elevation of the abdominal flap:** An incision is made 2 cm below the marked line to prevent scar migration and diathermy with beveled dissection exposes the rectus sheath. The umbilicus is dissected and flap dissection proceeds to the costal margin and xiphoid
- **Hernia repair and component separation:** After flap elevation, the hernia sac is dissected, contents reduce and the defect measured. A retro-rectus pocket is prepared and the posterior sheath/peritoneum repaired before closure. Polypropylene mesh with 2-5 cm overlap is placed behind rectus muscle, fixed without wrinkles and the anterior sheath closed in two layers to isolate the mesh
- **Closure of the abdominal flap:** During flap resection, the patient is placed semi-sitting to aid tension-free closure. Upper flap dissection stops at the costal margin to preserve blood supply. Midline linea alba is simulated with absorbable sutures. Downward traction and counter pressure help determine the excision line for symmetric closure. Umbilicus is repositioned midway between the symphysis pubis and xiphoid

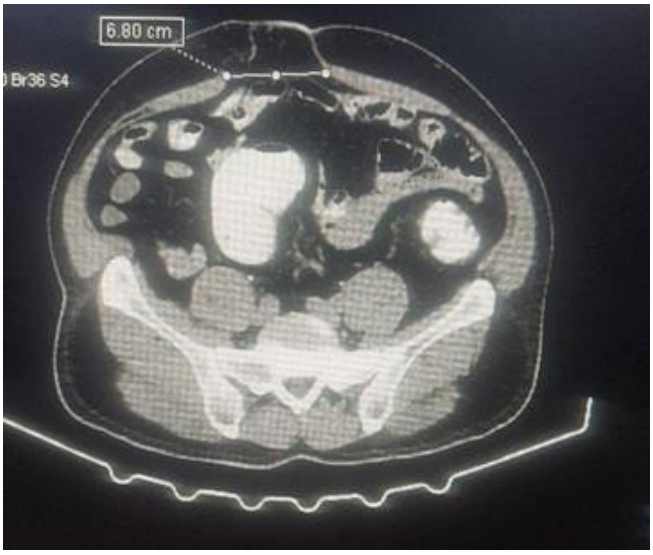

Figure 1: Axial CT Scan of the Abdomen Showing a Ventral Hernia with the Size of the Defect Measuring 6.8 cm

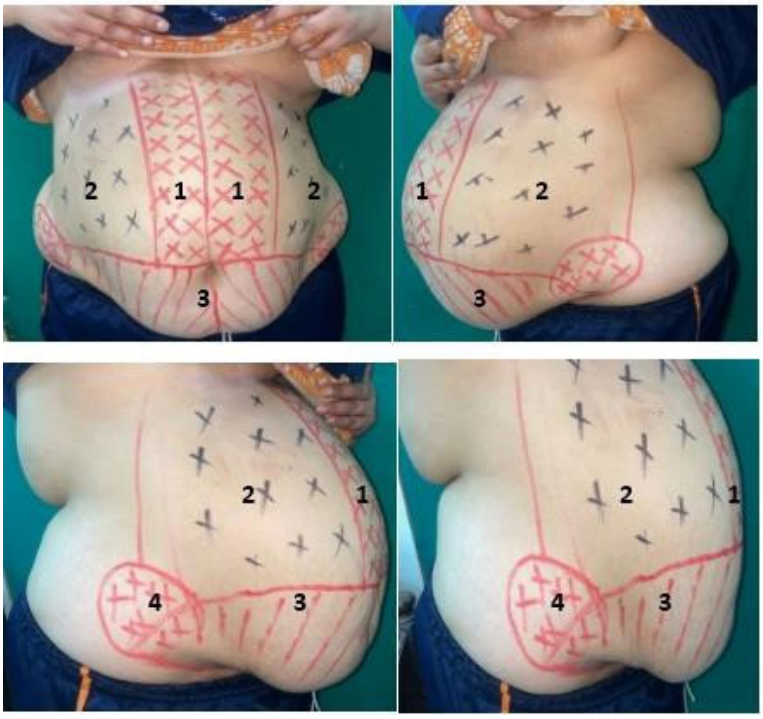

Figure 2: Preoperative marking
1: Area of complete dissection, 2: Area of discontinuous dissection, 3: Area for excision, 4: Area common for dog ear formation

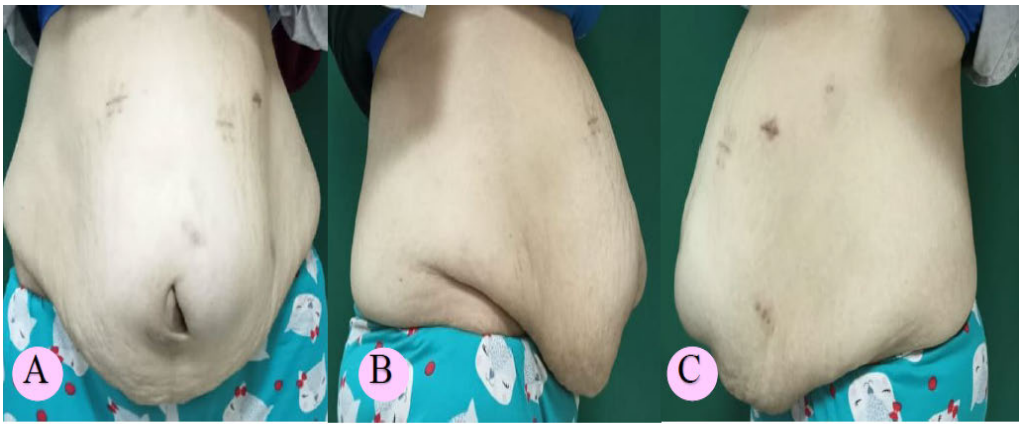

Figure 3(a-c): (a) Clinical Photographs Illustrating Preoperative Anterior and (b-c) Lateral views of 28-year-old female with prior history of bariatric surgery presenting with a large paraumbilical hernia
(hernia defect size = 7 cm) accompanied by significant redundancy of the anterior abdominal wall

After hemostasis, stay sutures help to distribute tension. A lateral suction drain exits through the upper thigh. Scarpa's fascia is closed under tension to protect deeper layers. The upper flap is advanced medially to remove dog ears, followed by deep dermal absorbable sutures. Skin is closed with subcuticular Prolene 4-0, adding simple interrupted stitches if necessary (Figure 3 and 4).

Postoperative Management

Early ambulation from the first night reduces VTE risk. Parenteral antibiotics are continued for 1 week. Drains are removed once output is less than 30 cc/24 hours, usually by the 5th to the 7th postoperative day (POD). Patients are advised to wear abdominal binder from POD 0 to 6 weeks. Follow-up extends to 12 months, assessing complications, recurrence and contour deformities. Outpatient visits are scheduled at 1 week, 2 weeks and 1, 2, 6, 9 and 12 months. All postoperative follow-up assessments were conducted by the operating surgical team, including the principal investigator and senior residents, using a standardized clinical evaluation protocol. Figure 5 shows immediate and late (6 months) postoperative results in one of our patients. The primary outcomes of our study were operative time and hernia recurrence; secondary outcomes included hospital stay, readmission and wound complications.

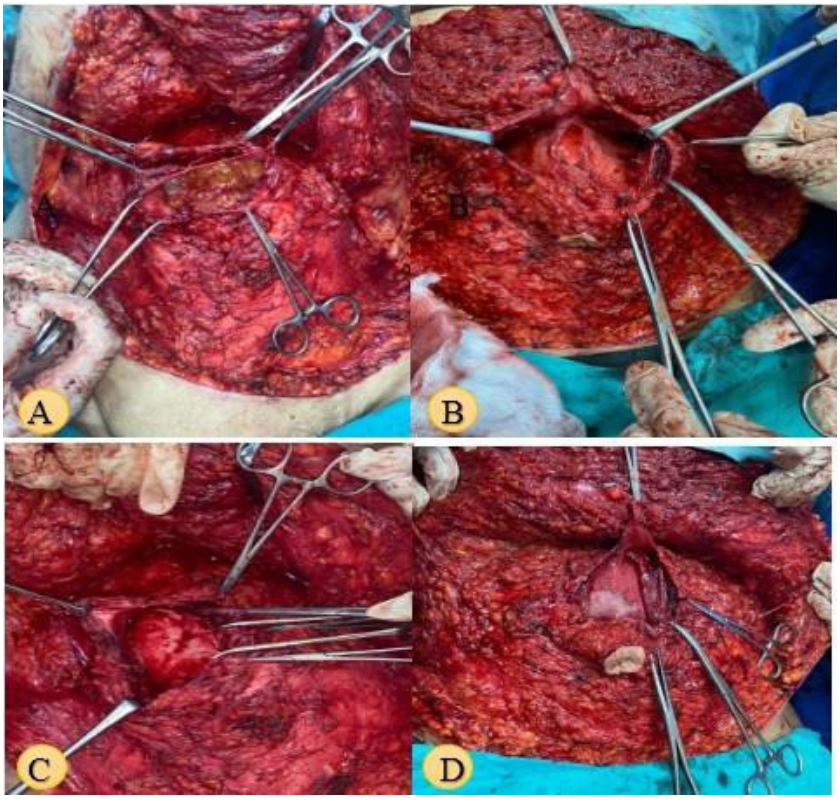

Figure 4(a-d): Posterior Component Separation in the Same Patient in Figure 3, (a) Hernia Sac is Excised, (b) A Retro-Rectus Pocket is Created, (c) Posterior Rectus Sheath and Peritoneum are Closed and (d) Mesh Placed in the Retro-Rectus Space

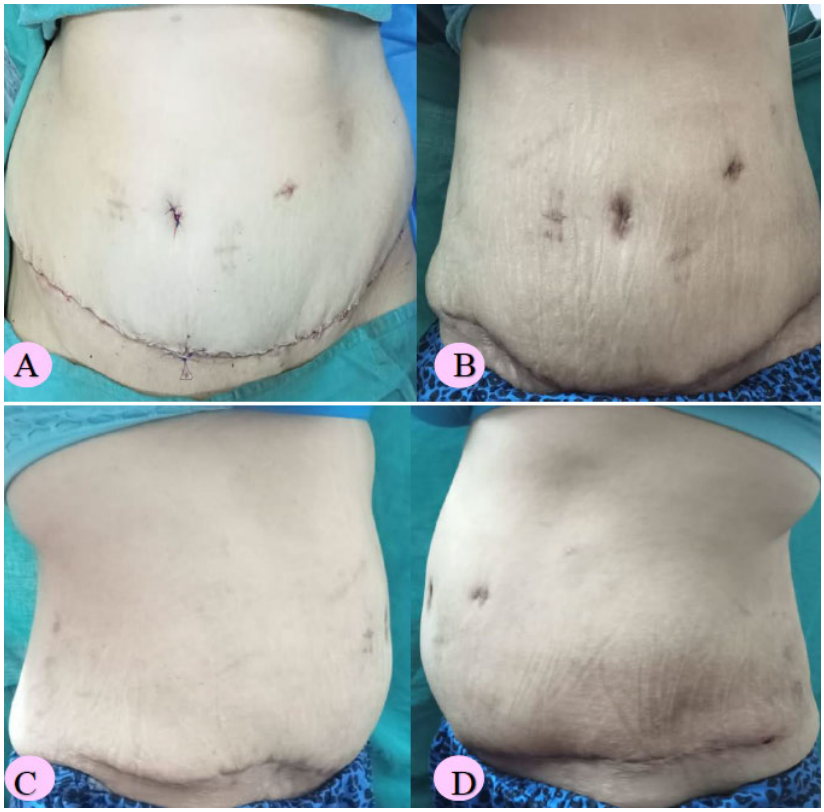

Figure 5(a-d): Postoperative result in the same case, (a) Immediate Postoperative Result (Site of Drain Exit is Not Shown), (b-d) Late (6 months) Postoperative Result in Anterior and Lateral Views

Statistical Analysis

Data were analyzed using SPSS 26 for windows (SPSS Inc., Chicago, IL, USA). Normality was tested with the Shapiro-Wilk test. Qualitative data were presented as frequencies and percentages, while quantitative data were shown as Mean±SD (Standard deviation) and range. Chi-square or Fisher's exact tests assessed qualitative differences. Independent t-test compared parametric quantitative variables between two groups. Pearson correlation analyzed variable relationships. Significance was set at p-value less than 0.05.

RESULTS

Our study included 20 females with large VH and lax abdominal wall. As summarized in Table 1, the mean age was 37.7±7.7 years. BMI ranged between 25.5-35 kg/m^2 with a mean of 31.8±3.1. Obesity class I (BMI: 30-35 kg/m^2) was detected in 16 patients (80%). All patients were multipara (range: 2-5 previous deliveries).

Paraumbilical hernia was the most frequent type of hernia (12 patients, 60%), while epigastric hernia was found in 8 patients (40%). Three patients (15%) were receiving treatment for hypertension (HTN) and two patients (10%) had controlled Diabetes Mellitus (DM). The size of hernia defect ranged between 5-10 cm (mean: 6.9±1.5 cm).

After combined liposuction assisted abdominoplasty (LAA), successful fascial closure was achieved in all cases using posterior CS with a mean operative time of 246±43.2 minutes. No intraoperative complications were reported. The length of hospital stay ranged from 5-14 days and the mean time for drain removal was 5.65±0.93 days (Table 2).

As shown in Table 3, the operative time correlated positively with age (r = 0.56, p = 0.009), BMI (r = 0.72, p<0.001) and size of the hernia defect (r = 0.57, p = 0.008). The length of hospital stay correlated positively and with age (r = 0.68, p = 0.001) but not with BMI or hernia defect size.

Regarding postoperative complications (POCs) in our study (Table 4), it was found that the overall complication rate was 25% (n = 5). Reported complications include wound dehiscence (15%), wound infection (15%), hematoma (15%) and hypertrophic scar formation (15%), umbilical necrosis (10%), dog ear deformity (10%) and skin necrosis (10%). No cases of hernia recurrence (detected by clinical examination or ultrasound imaging) were observed during the period of 12-months follow-up. Seroma, stitch sinus, VTE, readmission by POC or mortality were not observed during follow-up.

Our reported 25% overall complication rate encompasses five minor and manageable events (e.g., superficial seromas resolved conservatively), with no major complications, Clavien-Dindo grade IV events (Table 5) or readmissions-yielding a severe complication rate of 0%.

Between POD 6-10, three patients (15%) developed superficial wound infection with partial dehiscence of skin and subcutaneous fat. Infection presents with erythema, swelling, tenderness and warmth and resolved with conservative management by repeated dressing and parenteral antibiotics. No persistent or mesh-related infections were observed.

Table 1: Baseline Characteristics of the Studied Patients

Parameters	(N = 20)
Age (years) Mean±SD Range	37.7±7.7 25-50
Gender Female Male	20 (100%) 0 (0%)
BMI (kg/m^2) Mean±SD Range Overweight Obese	31.8±2.8 25.5-35 4 (20%) 16 (80%)
Parity Mean±SD Range	3.3±0.98 2-5
Type of VH Paraumbilical Epigastric	12 (60%) 8 (40%)
HTN	3 (15%)
DM	2 (10%)

BMI: Body Mass Index, VH: Ventral Hernia, HTN: Hypertension, DM: Diabetes Mellitus

Table 2: Perioperative Data of the Studied Patients

Parameters	(N = 20)
Size of hernia defect (cm) Mean±SD Range	6.9±1.5 5-10
Type of abdominoplasty LAA	20 (100%)
Component separation Anterior Posterior	0 (0%) 20 (100%)
Operative time (min) Mean±SD Range	246±43.2 180-330
Intraoperative complication No Yes	 20 (100%) 0 (0%)
Length of hospital stay (days)Mean ±SD Range	6.7±2.4 5-14
Time for drain removal (days)Mean ±SD Range	5.65±0.93 5-7

LAA: Liposuction assisted abdominoplasty

On POD 7, two patients (10%) developed distal flap necrosis, presenting with blanching, coldness and poor capillary refill, followed by color changes. One patient overlapped with infection and dehiscence, requiring surgical debridement and later closure with secondary sutures. The other patient had minor suture-line necrosis, managed with chemical debridement and healing by secondary intention.

Umbilical necrosis presents in two patients (10%) on POD 2 with color changes in the umbilicus. Few sutures around the umbilicus were removed and with close follow-up until the color gradually improved, except for a small area of tissue loss that did not affect the overall shape of the umbilicus.

We noticed a significant association between DM and impaired wound healing, diabetic patients (n = 2) had significantly higher rates of wound dehiscence (100% vs. 5.6%, p = 0.01), wound infection (100% vs. 5.6%, p = 0.01), hypertrophic scars (100% vs. 5.6%, p = 0.01) and overall complication (100% vs. 22.2%, p = 0.05) compared to non-diabetics (Table 6). Moreover, skin necrosis was more frequently encountered in diabetic patients (50 vs. 5.6%, p = 0.04). Other POCs did not show statistically significant differences.

As shown in Table 7, patients with POCs had significantly longer length of hospital stay compared to those

Table 3: Correlation Between Different Perioperative Data

	Age		BMI		Size of hernia defect	
Parameters	r	p value	r	p value	r	p-value
Operative time	0.56	0.009*	0.72	<0.001*	0.57	0.008*
Length of hospital stay	0.68	0.001*	0.39	0.08	0.08	0.71

R: Correlation coefficient, *Significant level at p-value <0.05

Table 4: Distribution of Postoperative Complications Among the Studied Patients

Parameters	(N = 20)
Wound dehiscence	3 (15%)
Wound infection	3 (15%)
Skin necrosis	2 (10%)
Umbilical necrosis	2 (10%)
Hematoma	3 (15%)
Dog ear	2 (10%)
`Hypertrophic scar	3 (15%)
Seroma	0 (0%)
Stitch sinus	0 (0%)
Hernia recurrence	0 (0%)
VTE	0 (0%)
Overall complication rate	5 (25%)

VTE: Venous Thromboembolism, Percentages represent the number of total patients who experienced each specific complication. Some patients had multiple complications

Table 5: Grading of Postoperative Complications Among the Studied Patients According to the Clavien-Dindo System

Complication	Management	Clavien-Dindo Grade	Justification
Wound dehiscence	Managed conservatively (dressings, no reoperation)	Grade I	No pharmacologic or surgical intervention required beyond local wound care.
Superficial wound infection	Repeated dressing and parenteral antibiotics	Grade II	Requires pharmacologic treatment with antibiotics.
Hematoma	Managed conservatively	Grade I	No pharmacologic or surgical intervention.
Hypertrophic scar formation	Conservative management (topical or steroid therapy)	Grade I	Minor postoperative sequela, managed conservatively.
Umbilical necrosis	Removing stitches only	Grade I	Minor intervention not requiring anesthesia or pharmacologic treatment.
Dog ear deformity	Secondary correction under anesthesia	Grade IIIb	Surgical correction under anesthesia.
Skin necrosis	Chemical debridement and healing by secondary intention	Grade II	Requires pharmacologic or topical chemical treatment, no surgical intervention.
Skin necrosis	Surgical debridement and secondary closure with sutures	Grade IIIb	

Table 6: Association Between Diabetes Mellitus (DM) and Postoperative Complications Among the Studied Patients

	DM		
Parameters	No (n = 18)	Yes (n = 2)	p-value
Wound dehiscence	1 (5.6%)	2 (100%)	0.01*
Wound infection	1 (5.6%)	2 (100%)	0.01*
Skin necrosis	1 (5.6%)	1 (50%)	0.04*
Umbilical necrosis	1 (5.6%)	1 (50%)	0.19
Hematoma	2 (11.1%)	1 (50%)	0.28
Dog ear	1 (5.6%)	1 (50%)	0.19
Hypertrophic scar	1 (5.6%)	2 (100%)	0.01*
Overall complication rate	3 (16.7%)	2 (100%)	0.052**

*Significant level at p-value <0.05, **Approaching significance at p-value ≈ 0.05

Table 7: Association Between Postoperative Complications (POCs) and Length of Hospital Stay

	Length of hospital stay (days)		
Parameters	Patients with no POCs	Patients with POCs	p-value
Wound dehiscence	6±1.75	9.5±3.3	0.008*
Wound infection	6.05±1.7	10.3±3.5	0.003*
Skin necrosis	6.27±1.9	10.5±4.9	0.01*
Umbilical necrosis	6.6±2.4	7.5±3.5	0.64
Hematoma	6.6±0.57	8.3±2.8	0.22
Dog ear	6.33±2.3	10±0	0.04*
Hypertrophic scar	6.05±1.7	10.3±3.5	0.003*
Overall complication rate	5.7±1.47	8.8±3.1	0.008*

without for wound dehiscence (9.5±3.3 vs . 6±1.75 days, p = 0.008), wound infection (10.3±3.5 vs . 6.05±1.7 days, p = 0.003), skin necrosis (10.5±4.9 vs. 6.27±1.9 days, p = 0.01), dog ear (10±0 vs. 6.33±2.3, p = 0.04) and hypertrophic scars (10.3±3.5 vs. 6.05±1.7 days, p = 0.003). The overall complication rate was also significantly associated with prolonged hospital stay (8.8±3.1 vs. 5.7±1.47 days, p = 0.008).

No statistically significant association was observed between POCs and either the size of hernia defect or the operative time ($p>0.05$). Patients with wound infection had a significantly higher BMI (34±1 vs. 31.8±3.3, $p = 0.05$) compared to others. While other POCs were not directly related to BMI, the mean BMI was slightly higher in cases presenting with dog ear deformity.

DISCUSSION

The repair of large VHs remains a significant challenge for surgeons; it is usually not feasible by simple approximation of rectus muscles as the defect is often too large and excessive tension would result [12]. These hernias are often associated with rectus diastasis, myofascial weakness, skin laxity and excess subcutaneous fat [103]. Thus, performing a comprehensive hernio-abdominoplasty in a single session is rational, as it corrects all abnormalities simultaneously while aiming to reduce morbidity.

Compared to men, women often have different abdominal wall elasticity and muscle tone due to pregnancy, hormonal variations and body composition. Additionally, large VH and/or rectus diastasis, are common postpartum events. All patients enrolled in our study were females, this is consistent with some recent studies [14-16] but is not in line with others which enrolled both male and female patients [17].

Our routine technique is liposuction-assisted abdominoplasty using traditional cannula suction. This aligns with Aboelatta *et al.* [18], who compared laser-assisted liposuction plus abdominoplasty with conventional methods, reporting higher complication rates with the laser technique and advising against its combined use with abdominoplasty.

Posterior Component Separation (PCS) was used in all our cases, unlike Akila *et al.* [16], who used ACS with rectus plication. PCS enables tension-free midline closure, optimal retro-rectus mesh placement and preservation of perforator vessels to lower flap necrosis risk compared to Anterior Component Separation (ACS). Studies reported fewer complications, lower recurrence rates, shorter recovery and less surgical site infection after PCS [19,20].

Surgeons have long avoided the combination of abdominal remodeling with hernia repair due to concerns about increased morbidity and extended operative time [21-23]. The American Society of Plastic Surgery Patient Safety Committee recommends elective surgeries be completed within four hours [24].

Despite these combined procedures in one session, we maintained a mean operative time of 246 minutes (4.1 hours), supporting the feasibility of combined approach without surpassing recommended operative time. A similar study by Erfan and co-authors reported a shorter mean operative time (184±28.8 minutes, range 150-240 minutes) compared to our study [15].

The mean length of hospital stay in our study was 6.7±2.4 days (range: 5-14 days). This is longer than the 3-day mean reported by Erfan and co-authors (1-5 days) [15] but shorter than the 8.7-day mean reported by Vetrone and colleagues (4-31 days) [25]. Patients with wound complications in our study had prolonged hospital stay. This aligns with findings of other studies reporting extended hospitalization in cases of wound infection [26].

Combined abdominoplasty and VH repair was a topic of debate. Shubinets *et al.* [27] reported lower hernia recurrence but more early complications and higher healthcare costs. Conversely, two recent studies showed this technique to be safe, effective across various VH defect sizes and beneficial for abdominal contouring, without added adverse events in selected patients [25,28].

Our overall complication rate was 25% with no cases of mortality, hernia recurrence or major systemic complications during follow up. Eltantawy *et al.* [29], reported a higher complication rate of 32%, while Erfan *et al.* [15] reported a 26.8% complication rate. Another study reported 16.5% complication rate, with 8.6% involving hernia recurrence [25]. Our reported rates of umbilical necrosis, skin necrosis and hypertrophic scarring are likely linked to the high BMI of our cohort, with 80% of patients being obese-a factor previously associated with elevated complication risks in similar studies [30,31].

We noticed a significant association between diabetes and wound complications, consistent with literature showing higher overall, major, minor and wound-related complications post-abdominoplasty [32]. This underscores the importance of perioperative glycemic control in these patients (glycated hemoglobin "HbA1c" below 6.5%) and multidisciplinary input to mitigate events of wound healing, with cross-reference to endocrinologist for preoperative optimization of uncontrolled cases.

In general, spontaneous evolution of skin necrosis with debridement, wound dressing and antibiotics if infection exists leads to healing by secondary intention. Skin grafting may be needed in cases with significant skin loss [33]. Hyperbaric oxygenation as an adjuvant therapy has been proposed to accelerate the healing process [34]. Negative Pressure Wound Therapy (NPWT) has also been found to stimulate wound neovascularization and collagen deposition in animal models [35]. However, there is no supporting evidence regarding acute operative wounds and no benefit has been described for NPWT when used in areas that have been closed by primary intention [36].

This combined approach offers safe and effective simultaneous fascial closure along with contour restoration, reduces the need for multiple hospital admissions and anesthesia exposure, shortens the recovery time and decreases overall health care costs.

Safety is operationalized as the absence of major adverse events (e.g., Clavien-Dindo grade IV complications like reoperation for infection or mesh erosion) within 30 days postoperatively, with minor events (grades I-II, such as seroma or superficial wound issues) also tracked. Effectiveness is defined as successful hernia repair, confirmed by clinical exam and imaging at 6-12 months, with no recurrence and restored abdominal wall integrity (e.g., via CT or ultrasound).

While patient-reported outcomes like satisfaction and quality of life are important in aesthetic surgery, our study's primary focus is on the technical feasibility, safety and objective clinical metrics of the combined procedure. We prioritized essential, quantifiable endpoints to guide surgical innovation in large ventral hernia cases.

CONCLUSIONS

Hernio-abdominoplasty with component separation is an effective technique for repair of large ventral hernias with accepted safety profile, especially in females with abdominal wall laxity. Due to low recurrence and acceptable wound complication rates, we recommend the use of this combined approach in selected patients with ventral hernia (i.e., large defect of 5-10 cm with abdominal wall laxity/diastasis especially in multiparous females, BMI less than 35 kg/m^2 and optimized comorbidities as controlled diabetes mellitus). Further studies with larger sample sizes and prolonged follow-up are needed to verify long-term outcomes.

Limitations and Points of Strength

While our study has certain limitations, such as the small sample size (20 patients), absence of a control group for direct comparison and relatively short follow-up period (12 months), it also has several strengths. The prospective design of the study minimizes recall bias, strict inclusion and exclusion criteria ensure a well-defined patient population and enhance reliability of results. The use of combined clinical, ultrasound and CT-based measurements provides precise hernia defect assessment.

We acknowledge that our sample of 20 patients limits statistical power for rare events. However, this size is appropriate for an initial prospective evaluation of a combined technique in a specific patient subgroup (large VHs with aesthetic needs) yielding consistent outcomes (e.g., 100% tension-free closure, 0% recurrence at 1 year).

While we recognize that late recurrence can occur, a 12-month follow-up remains consistent for early outcomes after surgery.

Conflicts of Interest

Authors declare that they have no conflict of interest.

Ethical Approval

All patients signed informed written consent for the use of their data and photographs. They accepted and were aware about the treatment they will receive after approval of the institutional board of ethics (approval number: MUFMIRB 824:6:2023).

REFERENCES

[1] Abulezz, T. "Components Separation Technique (CST) in Reconstruction of Large and Complex Abdominal Wall Defects." *Clinical Surgery*, vol. 2, 2017, p. 1816.

[2] Song, Z. *et al.* "Abdominal Wall Reconstruction Following Resection of Large Abdominal Aggressive Neoplasms Using Tensor Fascia Lata Flap with or without Mesh Reinforcement." *Hernia: The Journal of Hernias and Abdominal Wall Surgery*, vol. 22, no. 2, 2018, pp. 333-341. https://doi.org/10.1007/s10029-018-1738-8.

[3] Saad, H. *et al.* "Double-Mesh Technique Abdominal Wall Reconstruction for Severe Rectus Diastasis and Ventral Hernia Repairs (Two for Two)." *Egyptian Journal of Surgery*, vol. 38, no. 2, 2019, pp. 221-230. https://doi.org/10.4103/ejs.ejs_178_18.

[4] Cho, J. *et al.* "Retro-Rectus Placement of Bio-Absorbable Mesh Improves Patient Outcomes." *Surgical Endoscopy*, vol. 33, no. 8, 2019, pp. 2629-2634. https://doi.org/10.1007/s00464-018-6560-y.

[5] Bedewi, M. *et al.* "Prevalence of Adult Paraumbilical Hernia: Assessment by High-Resolution Sonography-A Hospital-Based Study." *Hernia: The Journal of Hernias and Abdominal Wall Surgery*, vol. 16, no. 1, 2012, pp. 59-62. https://doi.org/10.1007/s10029-011-0863-4.

[6] Muysoms, F. *et al.* "Classification of Primary and Incisional Abdominal Wall Hernias." *Hernia: The Journal of Hernias and Abdominal Wall Surgery*, vol. 13, no. 4, 2009, pp. 407-414. https://doi.org/10.1007/s10029-009-0518-x.

[7] Albanese, A. "Eventración Mediana Xifoumbilical Gigante; Método para su Tratamiento [Gigantic Median Xipho-Umbilical Eventration; Method for Treatment]." *Revista de la Asociación Médica Argentina*, vol. 65, nos. 709-710, 1951, pp. 376-378.

[8] Ramirez, O. *et al.* "'Components Separation' Method for Closure of Abdominal-Wall Defects: An Anatomic and Clinical Study." *Plastic and Reconstructive Surgery*, vol. 86, no. 3, 1990, pp. 519-526. https://doi.org/10.1097/00006534-199009000-00023.

[9] Le Gall, H. *et al.* "Abdominoplasty and Simultaneous Laparoscopic Ventral Hernia Repair: Clinical Study About 45 Patients." *Annales de Chirurgie Plastique et Esthétique*, vol. 62, no. 2, 2017, pp. 115-121. https://doi.org/10.1016/j.anplas.2016.06.005.

[10] Al-Qattan, M. "Abdominoplasty in Multiparous Women with Severe Musculoaponeurotic Laxity." *British Journal of Plastic Surgery*, vol. 50, no. 6, 1997, pp. 450-455. https://doi.org/10.1016/s0007-1226(97)90333-7.

[11] Nassem, A. *et al.* "Incisional Hernia Repair with Abdominoplasty." *Egyptian Journal of Hospital Medicine*, vol. 72, no. 6, 2018, pp. 4715-4724. https://doi.org/10.21608/ejhm.2018.9847.

[12] Halligan, S. *et al.* "Imaging Complex Ventral Hernias, Their Surgical Repair, and Their Complications." *European Radiology*, vol. 28, no. 8, 2018, pp. 3560-3569. https://doi.org/10.1007/s00330-018-5328-z.

[13] Heller, L. *et al.* "Component Separations." *Seminars in Plastic Surgery*, vol. 26, no. 1, 2012, pp. 25-28. https://doi.org/10.1055/s-0032-1302462.

[14] Elimian, H. *et al.* "Abdominoplasty Combined with Liposuction and Abdominal Herniorrhaphy as a Single Procedure for Ventral Hernia Repair: A Review of Six Patients." *Journal of Applied Sciences and Environmental Management*, vol. 27, no. 7, 2023, pp. 1477-1481. https://dx.doi.org/10.4314/jasem.v27i7.21.

[15] Erfan, M. *et al.* "Ventral Hernia Repair in Conjunction with Lipo-Abdominoplasty in Overweight Patients: A Comprehensive Approach." *International Wound Journal*, vol. 20, no. 5, 2023, pp. 1558-1565. https://doi.org/10.1111/iwj.14011.

[16] Akila, A. *et al.* "Abdominoplasty Combined with the Anterior Component Separation Technique for Reconstruction of Midline Large Ventral Hernias: Functional and Aesthetic Outcome Clinical Study." *Egyptian Journal of Plastic and Reconstructive Surgery*, vol. 46, no. 3, 2022, pp. 273-282. https://doi.org/10.21608/ejprs.2022.254735.

[17] Espinosa-de-Los-Monteros, A. *et al.* "Total Abdominal Wall Reconstruction with Component Separation, Reinforcement, and Vertical Abdominoplasty in Patients with Complex Ventral Hernias." *Aesthetic Plastic Surgery*, vol. 40, no. 3, 2016, pp. 387-394. https://doi.org/10.1007/s00266-016-0628-7.

[18] Aboelatta, Y. *et al.* "The Effectiveness and Safety of Combining Laser-Assisted Liposuction and Abdominoplasty." *Aesthetic Plastic Surgery*, vol. 38, no. 1, 2014, pp. 49-56. https://doi.org/10.1007/s00266-013-0242-x.

[19] Balla, A. *et al.* "Minimally Invasive Component Separation Technique for Large Ventral Hernia: Which Is the Best Choice? A Systematic Literature Review." *Surgical Endoscopy*, vol. 34, no. 1, 2020, pp. 14-30. https://doi.org/10.1007/s00464-019-07156-4.

[20] Kumari, N. *et al.* "Comparative Analysis of Anterior and Posterior Component Separation Techniques for Treating Large Ventral Hernias." *International Journal of Pharmaceutical and Clinical Research*, vol. 16, no. 5, 2024, pp. 719-723. https://doi.org/10.5281/zenodo.11409628.

[21] Koolen, P. *et al.* "Patient Selection Optimization Following Combined Abdominal Procedures: Analysis of 4925 Patients Undergoing Panniculectomy/Abdominoplasty with or without Concurrent Hernia Repair." *Plastic and Reconstructive Surgery*, vol. 134, no. 4, 2014, pp. 539e-550e. https://doi.org/10.1097/PRS.0000000000000519.

[22] Mazzocchi, M. *et al.* "'Component Separation' Technique and Panniculectomy for Repair of Incisional Hernia." *American Journal of Surgery*, vol. 201, no. 6, 2011, pp. 776-783. https://doi.org/10.1016/j.amjsurg.2010.04.013.

[23] McKnight, C. *et al.* "Concomitant Sublay Mesh Repair of Umbilical Hernia and Abdominoplasty." *Canadian Journal of Plastic Surgery*, vol. 20, no. 4, 2012, pp. 258-260. https://doi.org/10.1177/229255031202000413.

[24] Haeck, P. *et al.* "Evidence-Based Patient Safety Advisory: Patient Selection and Procedures in Ambulatory Surgery." *Plastic and Reconstructive Surgery*, vol. 124, no. 4 Suppl., 2009, pp. 6S-27S. https://doi.org/10.1097/PRS.0b013e3181b8e880.

[25] Vetrone, G. *et al.* "Simultaneous Ventral Hernia Repair with Abdominoplasty: A Feasible Approach." *SciBase Journal of Addiction and Recovery*, vol. 1, no. 1, 2024, p. 1002.

[26] Saeed, A. *et al.* "The Effect of Surgical Wound Infection on Postoperative Hospital Stay." *Egyptian Journal of Hospital Medicine*, vol. 90, no. 1, 2023, pp. 775-779. https://doi.org/10.21608/ejhm.2023.279933.

[27] Shubinets, V. *et al.* "Management of Infected Mesh After Abdominal Hernia Repair: Systematic Review and Single-Institution Experience." *Annals of Plastic Surgery*, vol. 80, no. 2, 2018, pp. 145-153. https://doi.org/10.1097/SAP.0000000000001189.

[28] Messa, C. *et al.* "Abdominoplasty with Umbilical Hernia Repair: A Long-Term Comparative Analysis of Clinical Outcomes." *Aesthetic Surgery Journal*, vol. 45, no. 3, 2025, pp. NP71-NP78. https://doi.org/10.1093/asj/sjae230.

[29] Eltantawy, M. *et al.* "Hernio-Abdominoplasty with or without Scarpa's Fascia Preservation for Ventral Hernia and Abdominal Wall Deformity." *Plastic and Reconstructive Surgery Global Open*, vol. 7, no. 7, 2019, e2302. https://doi.org/10.1097/GOX.0000000000002302.

[30] Ghnnam, W. *et al.* "The Effect of Body Mass Index on Outcome of Abdominoplasty Operations." *World Journal of Plastic Surgery*, vol. 5, no. 3, 2016, pp. 244-251.

[31] Niu, E. *et al.* "Obesity as a Risk Factor in Cosmetic Abdominal Body Contouring: A Systematic Review and Meta-Analysis." *Aesthetic Plastic Surgery*, vol. 48, no. 11, 2024, pp. 2121-2131. https://doi.org/10.1007/s00266-023-03602-w.

[32] He, Y. *et al.* "The Impact of Diabetes on Abdominoplasty Outcomes: A Systematic Review and Meta-Analysis." *Aesthetic Plastic Surgery*, vol. 49, no. 3, 2025, pp. 814-823. https://doi.org/10.1007/s00266-024-04565-2.

[33] Matarasso, A. *et al.* "Abdominoplasty and Abdominal Contour Surgery: A National Plastic Surgery Survey." *Plastic and Reconstructive Surgery*, vol. 117, no. 6, 2006, pp. 1797-1808. https://doi.org/10.1097/01.prs.0000209918.55752.f3.

[34] Berner, J.E. *et al.* "Uso de Oxígeno Hiperbárico para el Manejo de Heridas: Bases Físicas, Biológicas y Evidencia Disponible [Use of Hyperbaric Oxygenation for Wound Management]." *Revista Médica de Chile*, vol. 142, no. 12, 2014, pp. 1575-1583. https://doi.org/10.4067/S0034-98872014001200011.

[35] Wang, W. *et al.* "Vacuum-Assisted Closure Increases ICAM-1, MIF, VEGF and Collagen I Expression in Wound Therapy." *Experimental and Therapeutic Medicine*, vol. 7, no. 5, 2014, pp. 1221-1226. https://doi.org/10.3892/etm.2014.1567.

[36] Guffanti, A. "Negative Pressure Wound Therapy in the Treatment of Diabetic Foot Ulcers: A Systematic Review of the Literature." *Journal of Wound, Ostomy and Continence Nursing*, vol. 41, no. 3, 2014, pp. 233-237. https://doi.org/10.1097/WON.0000000000000021.